Tejent passes near Seraks, but is generally dry: its bed is about half a mile wide. The water from the melting snows and heavy rains is retained in large reservoirs closed by sluices, and distributed by canals for irrigation. Wells reach water at a depth of twenty feet.

The levelling carried on by the party has demonstrated, that, in leaving the Caspian Sea, there is not a general rise of the surface. At the wells of Aydine, several points are notably lower than the surface of the Caspian; and the whole region between the latter and the wells is a dried up arm of the sea. The aspect of the observations leads one to believe that they will show, when worked up, that there are many points in the sandy deserts between the Tekke oasis and Khiva which are lower than the Caspian; and it is already certain that the alleged former junction of the Tejent and Murial Rivers with the Oxus was an impossibility, and that, though nearer to each other, they emptied directly into the Caspian. Further work will be necessary to show the exact origin of the depressions met with in different parts of the steppes, and which have been taken for beds of ancient water-courses.

The expedition terminated its work at Seraks, and returned to Askabad by a different route.

PALMS.

SOME interesting details respecting these princes of the vegetable kingdom, as Linnaeus called them, are to be found in Sir Joseph Hooker's last report on the progress and condition of the Royal gardens at Kew. The extent to which they have recently been brought into cultivation is noteworthy.

Miller, in his Gardener's dictionary, edition of 1731, knew of seven species; but only two were generally known in conservatories, — the dwarf fan-palm of the south of Europe, and the date. Aiton's Hortus Kewensis, in the second edition (1813), enumerates only 24 species. The Loddiges, great cultivators of palms, who possessed in their day much the largest collection known, enumerate 210 species in their nursery catalogue of the year 1825. In the Herrenhausen conservatories, Hannover, Wendland had assembled 287 species in 1835, and 445 in 1882. This is the largest collection in the world; but the noblest must be that of the Botanical gardens of Buitenzorg, Java, which, in 1860, boasted of 273 species, 'all standing naked in the open air.'

It is only when the literature of the order is brought together systematically, that we appreciate the extent and the variety of palms. In the new Genera plantarum, Sir Joseph Hooker characterizes 132 genera of true palms, and indicates about 1,100 species.

Our readers may like to know what palms are indigenous to the United States, and what names they now bear. Without counting one or two tropical species which grow in southern Florida, and which are outlying Cuban and Bahaman species, we have two true palmettos, Sabal palmetto, and S. Adansoni; the blue palmetto, Rhapidophyllum hystrix of Wendland; the saw palmetto, Serenoa serrulata of Hooker. This is the old Sabal serrulata, upon which Hooker has recently founded a new genus, dedicating it to our associate, Sereno Watson (*Palmam qui meruit ferat*), there being already a Watsonia in honor of an earlier botanist of this name. Finally we have, just beyond our national borders, namely, on the islands off Lower California, a palm of a peculiar genus, instituted by Mr. Sereno Watson, the Erythea edulis; and in southern California the elegant Washingtonia bifera, with which Wendland has complimented our country by naming this palm in honor of its first president. The only other president so distinguished is Jefferson. Jeffersonia diphylla is one of our choicest spring flowers.

THE DEARBORN OBSERVATORY.

THE report of Prof. G. W. Hough, the director of the Dearborn observatory, to the board of directors of the Chicago astronomical society, exhibits an encouraging state of activity in that establishment. The eighteen-inch equatorial and the Repsold meridian circle have been kept in excellent order and in constant use; though it does not appear, from the report, that this latter instrument has been employed in any service where a smaller and less adequately equipped instrument would not equally have sufficed. The objects specially studied with the great telescope were the great comet of 1882, difficult double stars, and the planet Jupiter, in addition to which a few miscellaneous observations were made. The comet-observations are of interest as throwing some light on the question of the breaking-up of this body into three separate and distinct fragments, and the testimony of so powerful a glass is of high importance. Professor Hough's observations, from Oct. 5, 1882, to March 6, 1883, are all consistent with regard to the apparent separation of these three centres of condensation; but they were all the time connected by matter of less density, so that no complete separation took place between the parts of the head.

Sixty-six new double stars were discovered during the year, most of which are difficult objects, and can be measured only when the seeing is good. Professor Hough estimates that not more than one observing night in three is suitable for such observations. In the search for D'Arrest's comet, six new nebulae were detected, three of which were found by Mr. Burnham. The companion to Sirius was measured on a goodly number of nights by both these observers. Professor Hough expects this object to be, in a few years, entirely beyond the reach of all telescopes except the largest ones, as the distance between the components (now nine seconds of arc) is diminishing about three-tenths of a second annually.

The great red spot on the planet Jupiter, first noticed in 1878, and which has been, until the past year, of a reddish-brick color, has gradually grown paler, until, at the present time, it is barely visible. Professor Hough ventures the opinion that it cannot be seen much longer in any telescope. Its stability has been remarkable, not having changed very ma-

terially in length, breadth, outline, or latitude, during four years' time. A slow retrograde drift in longitude has, however, taken place quite uniformly. The summary of mean results of Professor Hough's micrometric measures of the spot is as follows: —

	1879.	1880.	1881.	1882.
Length	12.25″	11.55″	11.30″	11.83″
Breadth	3.46	3.54	3.66	3.65
Latitude	−6.95	−7.14	−7.40	−7.52

While the spot has remained thus nearly stationary in latitude, the south edge of the great equatorial belt has gradually drifted south during the late opposition, until it is nearly co-incident with the middle of the spot. But, what is remarkable, the two do not blend together, but are entirely distinct and separate, seeming thus to indicate that they are composed of matter having repellent properties, similar to two clouds charged with the same kind of electricity.

In the years 1664, 1665, 1666, a great spot, with a diameter of some eight thousand miles, or about one-tenth that of Jupiter, was observed by Hook and Cassini, and situate in latitude 6″ south of the planet's equator. The spot re-appeared and vanished eight times between 1665 and 1708, was invisible from this latter year until 1713, and the longest period of its continuous visibility was three years, and of its disappearing, five. Professor Hough suggests the possible identity of that great spot with the present one, taking much the same ground with Russell of Sydney, — that it is a portion of the solid body of the planet, or *Jupiter firmus*, so to say, and is ofttimes rendered invisible by a covering of clouds. Professor Hough does well to call attention to the incorrect statement, so universally made in the astronomical text-books, that new belts are formed on the disk of the planet in the course of a few hours' time. The appearance of the disk changes from hour to hour, owing to the rapid axial rotation of the planet; and, as we pass from the equator to the poles, the apparent transit of an object across the disk becomes slower and slower. Observers, even at the present time, not always realizing that they are looking at a globe, and not at a plane surface, make statements regarding rapid changes in size or shape of objects on the planet's disk that are not legitimate deductions from the actual observations.

Regarding other configurations of the disk of Jupiter, Professor Hough notes the drifting south of the great equatorial belt nearly two seconds of arc during the late opposition. Small oval white spots were observed to be quite numerous. They were difficult to observe, and their identification is somewhat uncertain; but they appear to have a general retrograde drift at the rate of seventy miles per hour. Great numbers of minute white spots and markings near the equatorial regions were also observed, the discussion of which is reserved; but it is a curious fact that these spots should drift for years with the enormous velocity of two hundred and sixty miles per hour, if they are nothing more than clouds in the planets' atmosphere. The series of micrometric measurements on all these belts and spots appears to have been sufficiently elaborate, and the results derivable from a complete discussion of them will surely possess much of interest. Four sketches accompany the report, which show the salient features of the disk merely, no attempt having been made to represent the minute detail of the equatorial markings.

About the average success is reported in the contact-observations of the transit of Venus, of December, 1882. Mr. Burnham assisted in taking a number of dry-plate photographs of the planet on the sun, which present very sharp outlines of the disks of the sun and Venus. The method of insuring a minimum exposure, ordinarily in use by photographers, was employed; the equivalent exposure for any part of the sun's disk being as short as one sixteen-hundredth part of a second. Professor Hough regards these experiments as showing conclusively that astronomical photography will be most successful when the time of exposure becomes a minimum.

DAVID P. TODD.

A NEW MOTOR.

THE pneumatic tramway engine company of New York has recently issued a prospectus, in which it presents the claims of compressed air as a motor for short lines, with statements of the results of experiments with a motor built for them by the Baldwin locomotive-works. The engine was used, experimentally, on the Second-Avenue elevated railroad in New-York City, with what would seem to have been very satisfactory results.

The locomotive has four driving-wheels, two working cylinders of twelve inches and a half diameter and eighteen inches stroke of piston, with running-gear like that of the standard steam-locomotive of small power. In place of the boiler there are four air-reservoirs, each three feet in diameter, of Otis steel, half an inch thick, having a tenacity of seventy-five thousand pounds per square inch of section, and made up with the spiral seam introduced by Root. These reservoirs are tested to eight hundred pounds per square inch, and are filled with air at six hundred pounds. A small steam-boiler inside the cab is used as an air-heater, and raises the temperature of the air leaving the reservoirs, and on its way to the cylinders, to about 240° F. A reducing-valve causes the pressure to fall, at the cylinders, to a hundred pounds per square inch, the working-pressure for the engine. The cylinders are lubricated in part by the water taken up in the heater, where the air bubbles up through the confined liquid, and in part by oil, introduced for that purpose. The main valve is worked in full gear, and expansion is obtained by the use of an independent 'cut-off valve' on its back.

The 'braking system' is as novel as it is ingenious and effective. The engines are reversed, as in the method of Le Chatellier; and they thus become pumps, taking in air, which is forced into the main reservoirs to replace that expended in propulsion.